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Why should sustainable finance be given priority? Lessons from pollution and biodiversity degradation

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The concept of sustainable finance is a relatively new concept that is increasingly accepted by the financial industry since the Berne Declaration came together to promote sustainable finance in the commercial sector. Although sustainable finance is very apt and timely, many issues need to be addressed if this concept is to be meaningful and it is to achieve its desired objectives. Some of the issues that need to be clarified and addressed include (1) defining the kind of sustainability that is envisaged (2) examining issues relating to the use of high discount rates and its compatibility with the goals of sustainability (3) the case of excessive pollution due to adverse selection, moral hazard and lobbying and (4) specialisation and path dependent systems that are detrimental to future production.

This paper discusses these issues, providing examples from pollution and biodiversity degradation. The paper also shows why economic growth without considering pollution impacts and path dependent systems is detrimental to future production which violates the concept of sustainable finance. This discussion demonstrates why the concept of sustainable finance is timely and why it is necessary to take into account the potential issues that need to be addressed. The challenges that lie ahead are many, and the sooner they are addressed, the more credible and potent sustainable finance will be.

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Why should sustainable finance be given priority? Lessons from pollution and biodiversity degradation

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Abstract

The concept of sustainable finance is a relatively new concept that is increasingly accepted by the financial industry since the Berne Declaration came together to promote sustainable finance in the commercial sector. Although sustainable finance is very apt and timely, many issues need to be addressed if this concept is to be meaningful and it is to achieve its desired objectives. Some of the issues that need to be clarified and addressed include (1) defining the kind of sustainability that is envisaged (2) examining issues relating to the use of high discount rates and its compatibility with the goals of sustainability (3) the case of excessive pollution due to adverse selection, moral hazard and lobbying and (4) specialisation and path dependent systems that are detrimental to future production.

This paper discusses these issues, providing examples from pollution and biodiversity degradation. The paper also shows why economic growth without considering pollution impacts and path dependent systems is detrimental to future production which violates the concept of sustainable finance. This discussion demonstrates why the concept of sustainable finance is timely and why it is necessary to take into account the potential issues that need to be addressed. The challenges that lie ahead are many, and the sooner they are addressed, the more credible and potent sustainable finance will be.

1. Introduction

The concept of sustainable development has received much attention since the publication of the Bruntland report (WCED, 1987). However, sustainable finance is a relatively new concept that is fast becoming important as financial investments are increasingly required to prove sustainability credentials[1]. Although a clear definition of sustainable finance is warranted, the broad consensus is that it would encompass economic, environmental and social sustainability of finance. However, with regards to this special journal issue, the onus is on environmental and social sustainable finance. In this paper, however, sustainable finance issues relating only to the environment are dealt with.

As resource degradation and pollution impacts increases, future investments with potential negative externalities are likely to be scrutinised over the environmental impacts and the long-term environmental sustainability of such projects. Be it government or private investment capital, funding of such projects will be increasingly tied, amongst other factors, to the environmental sustainability of such projects. A good case in point is the Gunns limited paper mill project in the Tamar Valley (see, http://www.gunnspulpmill.com.au/) in Tasmania, Australia, where private capital is not so easily forthcoming, mainly based on serious doubts raised on the environmental impacts of the project, public protests and its long-term environmental sustainability.

As pointed out by a WWF (2006) report, the financial sector's environmental and social responsibility during the last decade and a half was driven to a 'large degree by outside pressures'. As the report states 'Beginning in 2000, environmental organisations such as Friends of the Earth (FoE) and the Rainforest Action Network (RAN) challenged the industry with high-profile campaigns that highlighted cases in which commercial banks were "bankrolling disasters". In 2002, a global coalition of non-governmental organisations (NGOs) including FoE, RAN, WWF-UK and the Berne Declaration came together to promote sustainable finance in the commercial sector.

As we now know, this informal network has evolved into BankTrack (see, http://www.banktrack.org/), whose vision for sustainable finance was expressed in the Collevecchio Declaration of January 2003 (see, http://www.evb.ch/es/p25001979.html). The

[1] This refers to the investment merits of sustainable finance projects.

first of the six commitments to key principles under this declaration is a commitment to environmental and social sustainability. Following this declaration, 'The Equator Principles' (see, http://www.equator-principles.com/) were developed in 2003 by four of the largest private sector banks. They were the Citigroup, ABN AMRO, Barclays and WestLB. The principles are an industry benchmark set for the financial industry to manage environmental and social issues in project financing. These principles are based on the International Finance Corporation's (see, http://www.ifc.org/about) environmental and social safeguard policies (WWF, 2006). With the major institutions governing financial institutions lending support to environmental and social sustainability, it is to be expected that commercial organizations are likely to endorse and become signatories either due to increasing industry needs, coercion or due to genuine acceptability of the environmental and social responsibilities of capital investments.

All indications are that sustainable finance will be increasingly embraced by the financial industry judging by the initial reaction to this concept (see, for example, WWF, 2006). However, there are many issues that need to be clarified and addressed if environmental financial sustainability is to be truly meaningful.

It is clear from the available literature on sustainable finance that the path of environmental sustainability the financial industry seeks to pursue is unclear. In other words, there is no benchmark that the industry is striving to achieve. Another important issue that need to be examined is the relationship between high discount rates and the concept of environmental sustainability. Are the two issues compatible? In other words, could high discount rates prevail and yet achieve sustainability? This has enormous implications for the concept of sustainable finance as will be dealt with in the paper.

Furthermore, an issue that should be kept in mind with sustainable finance is that unfettered markets do not take into account freely available non-marketed goods and services. In such cases many of the social costs may not be taken into account. It is likely that environmental credentials of investors will be over emphasised. Adverse selection and moral hazard issues are likely to arise.

Another major issue that needs to be taken into account is that of industry lobbying that seek weaker instruments of pollution control that are likely to be ineffective in internalising externalities.

Furthermore, issues relating to the concentration of production that are likely to lead to the degradation of resources also need to be addressed. Finally, it is important to demonstrate that economic growth without considering pollution impacts and path dependent processes is detrimental to future production. This paper strives to address these issues briefly.

The paper is set out as follows. Section 2 provides an overview of the sustainability issues, production process and discount rates in relation to the concept of sustainable finance and Section 3 presents a discussion on what are the other likely issues that should be kept in mind in dealing with sustainable finance. Examples from pollution and biodiversity degradation are discussed in Section 4 where the case of excessive production and pollution and biodiversity degradation are highlighted. In Section 5, it is shown that economic growth without considering pollution impacts and path dependent systems, as is now happening, is detrimental to future production and is in violation of the concept of sustainable finance. Section 6 concludes with a discussion of the main results.

2. Sustainability issues, production process and discount rates

Sustainability is a popular phrase and definitions pertaining to sustainability abound. However, a widely used and one of the best-known definitions which should ideally capture the concept of sustainable finance is that given by the Bruntland Commission (WECD, 1987). It defines sustainable development as '*development that meets the needs of present generations without compromising the ability of future generations to meet their own needs*'.

Another definition that is very apt when we discuss sustainable finance is that given by the Norwegian economist, Ger Asheim (1994). According to him sustainability is '*a requirement to our generation to manage the resource base such that the average quality of life we ensure ourselves can potentially be shared by all future generations'*. Although no formal definition of sustainability has been provided, what this new emerging field of sustainable finance implicitly assumes is that 'finance', corporate or otherwise, should be used in a manner to generate economic activity that does not compromise the future ability to produce the same

level of economic activity. The concept of sustainability implicitly refers to intra as well as inter generational sustainability. As Hanely et al (2001) points out 'two main features of these definitions of sustainable development are: (1) fairness across generations and (ii) fairness within generations. Sustainability is thus principally an equity, rather than efficiency issue'.

Interestingly, financial investment valuation takes into account only costs and benefits in terms of their impact on firms and shareholders. One method applied is the net present value (NPV) test. This simply asks whether the sum of discounted gains exceeds the sum of discounted losses. The project is accepted if NPV >0. The major problem in simple financial investment appraisal or in a cost-benefit analysis is that the valuation of non-marketed goods (for example, wildlife, landscapes, environmental sinks, ecosystem and agricultural complexity) is ignored. Hence, subjecting projects to a NPV test is not a test of environmental sustainability. Hence, NPV test should be subject to sustainability constraints when dealing with sustainable finance.

Another important issue that arises when dealing with sustainability in general or sustainable finance in particular is the type of sustainability which the financial industry is seeking to follow. Is the financial industry planning towards weak or strong sustainability? A weak form of sustainability is where there are no declines in capital (see, for example, Hanley et al. 2001). Such a system can be defined as follows:

No declines in: $K_n + K_h + K_m = \mathbf{K}$

where K_n is natural capital, K_h is human capital and K_m is man-made capital. **K** is total capital stock. This concept means we can exhaust natural capital as long as we substitute it with human and man-made capital so that the total capital stock remains the same. This is consistent with the neoclassical economist's view that natural and created capital are substitutes in production. As Goodstein (2008) points out ' they are technological optimists, believing that as resources become scarce, prices will rise, and human innovation will yield high-quality substitutes, lowering prices once again'.

On the other hand, strong sustainability can be defined as a system where there are no declines in K_n or rather in critical capital, K_n. Substitutability to maintain the total capital stock is not permitted. This is the ecological economist's view who argues that natural and

created capital is fundamentally complements. In other words, they are used in production together and have low substitutability. As Goodstein (2008, 119) states '*Ecological economists are technological pessimists – fundamentally they believe that rapid increases in population, and even faster increases in consumption, are putting unsustainable pressure on our natural resource base. In individual cases such as fuel cell-powered cars, created capital may substitute for natural capital. But at a general level, created and natural capital are complements in production. This is to say, ecologicals believe that we are "running out" of the inexpensive natural capital that forms the base of our economic well-being: both natural resources, such as freshwater and topsoil, and the environmental sinks that absorb our wastes*'.

Another aspect that needs to be considered in relation to sustainability is that of discount rates. High discount rates could penalise investments with long-term payoffs. Therefore, high market discount rates, if not well planned (e.g. without Environmental Impact assessments) and invested, could be incompatible with the tenets of both neoclassical and ecological schools of thought and hence undermine the whole concept of sustainable development as defined by WECD (1987) or Ger Asheim (1991). High discount rates are unlikely (in most cases) to result in environmentally friendly investments. As we know corporate investments have shorter time horizons.

This is because private capital often requires rates in the range of 15 percent or more to initiate an investment (Goodstein, 2008). As Goodstein (2008) points out this is due to two reasons:

(1) They reflect only the private benefits of investment and fail to account for the external costs of growth.
(2) Such high returns are required to induce people to save and invest their income, rather than consume it today.

This is referred to as positive time preference which refers to a desire to consume as much in the short-term than waiting until a later date. Such preferences prevent the investments with long-term payoffs, which is usually the case with environmental benefits or sustainability.

However, as Goodstein (2008) further points out, low discount rates are not always 'pro environment' either. For example, large dams with high up-front costs and a long stream of future benefits may be favoured, since the public are likely to 'enjoy cheap electricity and recreational opportunities for decades'. It is worth noting that while private capital requires high discount rates, governments use a much lower discount rate with Environmental Protection Agencies using a discount as low as 3 percent (see, for example, Goodstein, 2008).

It is also worth noting that investments in products with high environmental benefits (e.g. some renewable energy sources) with high returns do not necessary attract sufficient investments. This is because the returns take a long time to be generated. On the other hand as Goodsetin (2008, p.106) points out 'private investors evaluate projects using high market discount rates, reflecting the private opportunity cost of their capital. The fact that energy companies can make a 20% rate of return on conventional investments in oil properties means that they can earn their investments back in 5 years. Access to these high market rates of return gives market actors very short time horizons'.

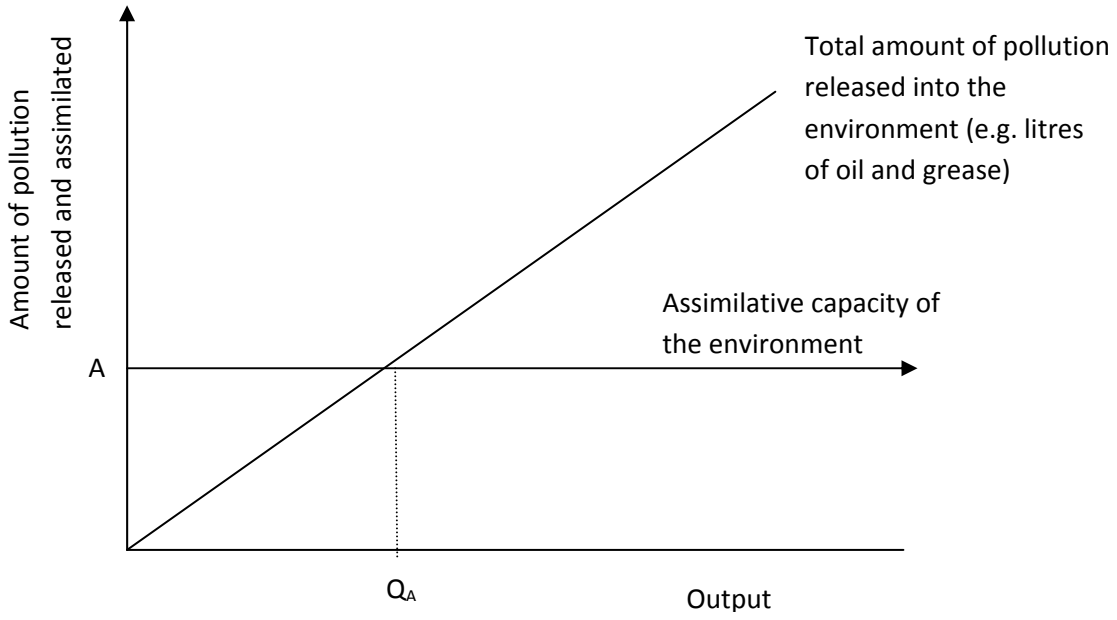
High discount rates seeking high returns which are based on private returns are likely to lead to lowering/evading penalties or putting off internalising social and environmental costs. High discount rates are also likely to encourage the concentration and specialisation of production. These issues are discussed in more detail in Sections 3 and 4.

3. What are the other likely issues that should be kept in mind in dealing with sustainable finance?

An issue that should be kept in mind in discussing sustainable finance is that an unfettered market system does not take into account the true value of using non-market (zero-priced), freely provided environmental resources and appropriate discount rates that are conscious of the environmental impacts and long-term environmental sustainability. Therefore, freely available environmental goods and services are likely to be over utilized and unfettered markets with inappropriate discount rates will result in resources being used inefficiently from an environmental sustainability point of view. As Turner et al., (1994) point out 'there is a divergence between private and social costs'. When output increases so does the amount of pollution which has to be assimilated by the environment. However, with increasing production, the amount of pollution released exceeds the assimilative capacity of the

environment[2]. Hence, pollution released becomes a problem. Figure 1 shows that at Q_A, output produced is equal to the amount of pollution released into the environment. When output increases beyond Q_A, then the environmental assimilative capacity is exceeded.

Figure 1: Output, pollution and assimilative capacity of the environment

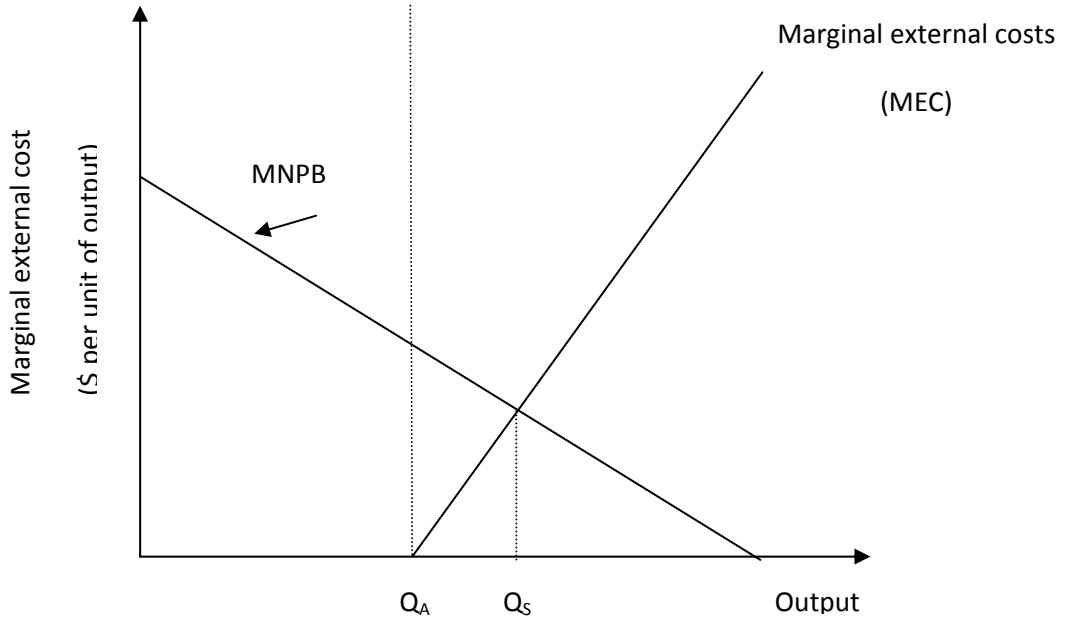


Source: Adapted from Turner et al., (1994, p.75).

In order to avoid pollution damage to the environment and hence society, it is important to take into account marginal external costs and internalise them. Sustainable finance should be mindful of this fact. When the pollution that is released into the environment is greater than the assimilative capacity, the pollution begins to impose external costs on society. Furthermore, the external costs increase with increasing output. A simple illustration of this is shown in Figure 2. The figure also shows the marginal net private benefits (MNPBs). As can be seen, marginal external costs (MEC) increase as pollution accumulates with increasing production. Hence, the damage done to the environment, too, increases when the per unit of output increases. Discount rates selected are likely to influence the extent of the environmental damage.

[2] This is likely to be exacerbated by the discount rates used.

Figure 2: Marginal net private benefit, marginal external costs and social optimum level of output



Source: Adapted from Turner et al., (1994, p.76).

In Figure 2, the social optimum level of output is at Q_s. This is obtained by subtracting the external costs from the producers' MNPB. It is the responsibility of the respective environmental regulators to take into account the social costs of production and compel polluters to pay for the pollution they generate. Only when these external costs are taken into account (internalized) that production will move from a private profit driven market optimal level of output to a socially optimal level of output. In other words a private firm's market decision rule is that output should be produced if the firm gains a positive marginal net private benefit (MNPB) (i.e. if MR>MVC), up to the point where MR=MVC, the market optimum level of output. If the regulators are to take into account the costs of pollution into account, then the social decision rule is that external costs (MEC) must be included in the market price of the good produced. In other words, polluters should be made to pay for the pollution they generate in producing goods and services.

Hence, as demonstrated in Figure 2, there is a need for sustainable finance to account for the social costs in market prices of manufactured goods and services. However, the question that

arises is whether sustainable finance will be benched marked[3] against social costs being taken into account. Even if such bench-marking is imposed, investors who are not included in internalising externalities in order to maximise profits, are likely to get around this issue in at least two ways.

One method relates to adverse selection. A polluter with no environmental credentials is unlikely to divulge all information regarding pollution generated from production to potential lenders. In fact, the biggest polluters are likely to exaggerate environmental credentials. This is also a good public relations exercise.

The second involves moral hazard. Investors, after obtaining finance for their projects or those already in the industry could drop/non implement promised environmental standards or in other cases resort to lobbying the relevant regulators in order minimise the extent of external costs that needs to be taken into account in the production process. As Goodstein (2008) states '*Because regulatory decisions impose substantial costs on affected industries, businesses will devote resources to influence the discretion that regulators exercise (in ethical, questionably ethical, and unethical manners) just as they devote resources to minimizing labour or energy costs'*.

In the next section, a case where industry influence is applied to 'capture' the regulator in relation to pollution control is discussed. In this manner, regulation is supplied by the regulator in response to the industry's demand for regulation or the regulatory authority is controlled by industry by coercion, influence and 'other methods'. Section 4 also discusses a problem that is less known, but yet is having a major impact on the degradation of natural capital which sustainable finance has to be aware of and adopt mitigating measures.

[3] Refers to a standard by which the quality/effectiveness of sustainable finance can be measured.

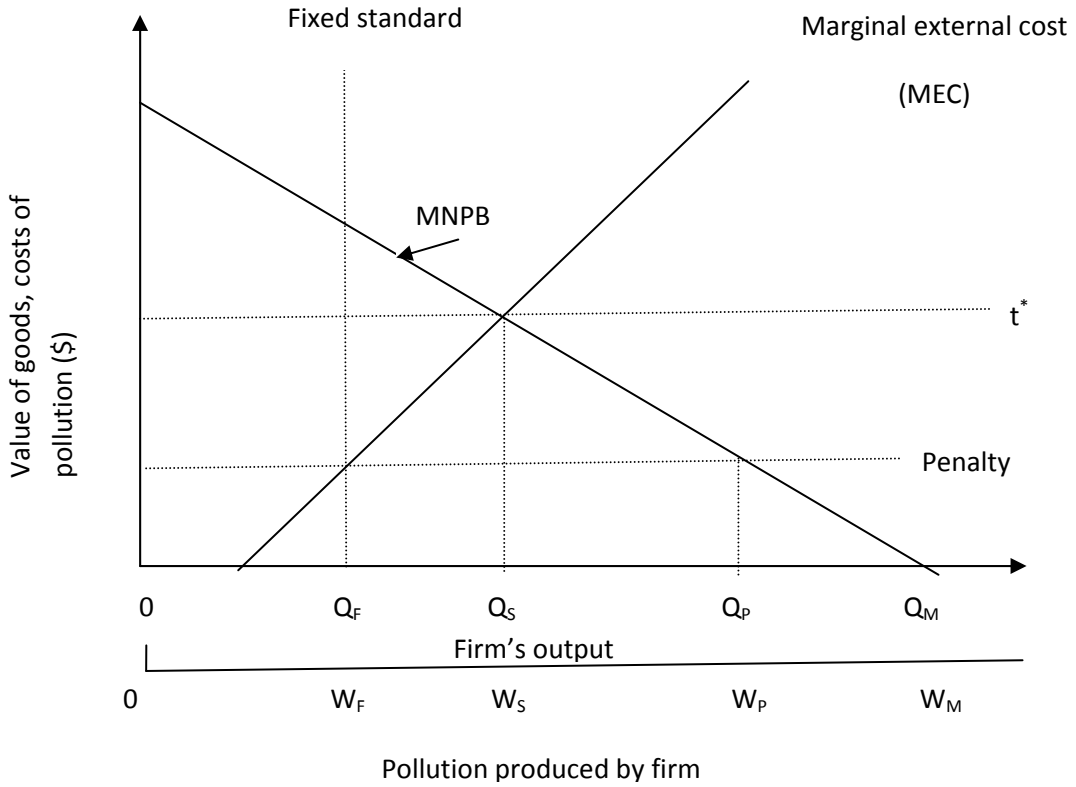
4. Examples from pollution and biodiversity degradation

This section discusses two issues which sustainable finance has to deal with if this concept is to be truly meaningful and to make production and services environmentally sustainable. They are as mentioned in Section 3, how industry would influence the regulator to obtain the type of pollution control which industry prefers and which is less harmful to their production activities and profitability. This relates to the case of excessive production and pollution. The case of fixed emissions standards being preferred as opposed to a pollution tax is demonstrated. The second issue, which is not well known in the literature, is the degradation of biodiversity, an important factor of production, due to the emergence of 'path dependent' systems of production being created due to specialisation and concentration of production. As experience shows, they are not easy issues to grapple with. However, the credibility of sustainable finance thus lies in addressing such issues rather than the concept being a good public relations motto for the finance industry and its investors to showcase.

4.1 The case of excessive production and pollution

Figure 2 in Section 3 showed that when the amount of pollution released exceeds the assimilative capacity, external costs begin to increase. Theoretically, at least two instruments can be used to internalise the external costs. This is shown in Figure 3. For example, introducing a fixed standard for pollution generated should limit the amount of pollution released into the environment. This is shown at Q_F of firm's output.

Figure 3: Comparing the effectiveness of a pollution tax with a fixed emissions standard associated with penalties



Source: Adapted from Turner et al., (1994, p.169).

At this point, the amount of pollution released is W_F. However, real world experience shows that penalties for violating a fixed standard have been historically set 'too' low. This is shown by the broken line. In such a case firms may only reduce pollution where the penalty>MNPB. In other words, reducing output from Q_M to Q_P (reducing emissions from W_M to W_P). On the other hand, the tax, t* has been set to achieve the socially optimum output at Q_S where pollution generated is W_S. This is efficient, where as if the penalty is to be efficient, then the level of penalty has to be increased to the level of tax, t*. However, it should be noted that a pollution tax can also be set too 'low' due to pressure from lobby groups. However, in reality, this is less likely than fines being set too low.

One may wonder why penalties are set too low. One main reason as explained earlier is due to lobbying or polluter pressure imposed on the environmental regulator. It is well known in the regulatory economics literature that by design or not, the institution that is meant to

regulate is 'captured' by industry. This is known as capture theory (Viscusi et al., 1995). According to this strand of thinking, Command and Control (C&C) regulation is supplied by the regulator in response to the industry's demand for regulation or the regulatory authority is controlled by industry by coercion, influence and 'other methods'. However, in both cases, regulators are 'controlled' by an industry or a firm. Turner et al., (1994) elaborate this point best:

'This 'capture' concept refers to the tendency for the regulator and the polluter to seek common ground and cooperation. Once captured, administrators begin to see that they need to protect existing members of an industry and, therefore, regulate it accordingly. New entrants are excluded, subsidies are offered and difficult decisions are put off until prospects 'improve'.

Young (1992) argues that this 'rent seeking' behaviour is inefficient and tends to bias investment decisions and leads to further extensions in regulatory capture.

Therefore, the implication is that once the required capital has been obtained, there is no mechanism that prevents such a situation happening. This is an issue which sustainable finance has to address if the concept is to be truly meaningful and effective. Otherwise, the whole concept is likely to lose credibility. Interestingly, Kelman (1981) found from a survey of industrialists in the US that 85 percent of them were opposed to pollution taxes on the grounds that these increased the financial burden relative to a C&C regulatory approach.

4.2 Biodiversity degradation

In the last section, the case of excessive pollution was discussed in order to illustrate some issues sustainable finance has to confront in relation to pollution. In this section, another pertinent issue which is well known is that of degradation of natural capital, an important factor of production. The case of biodiversity degradation is discussed in this section.

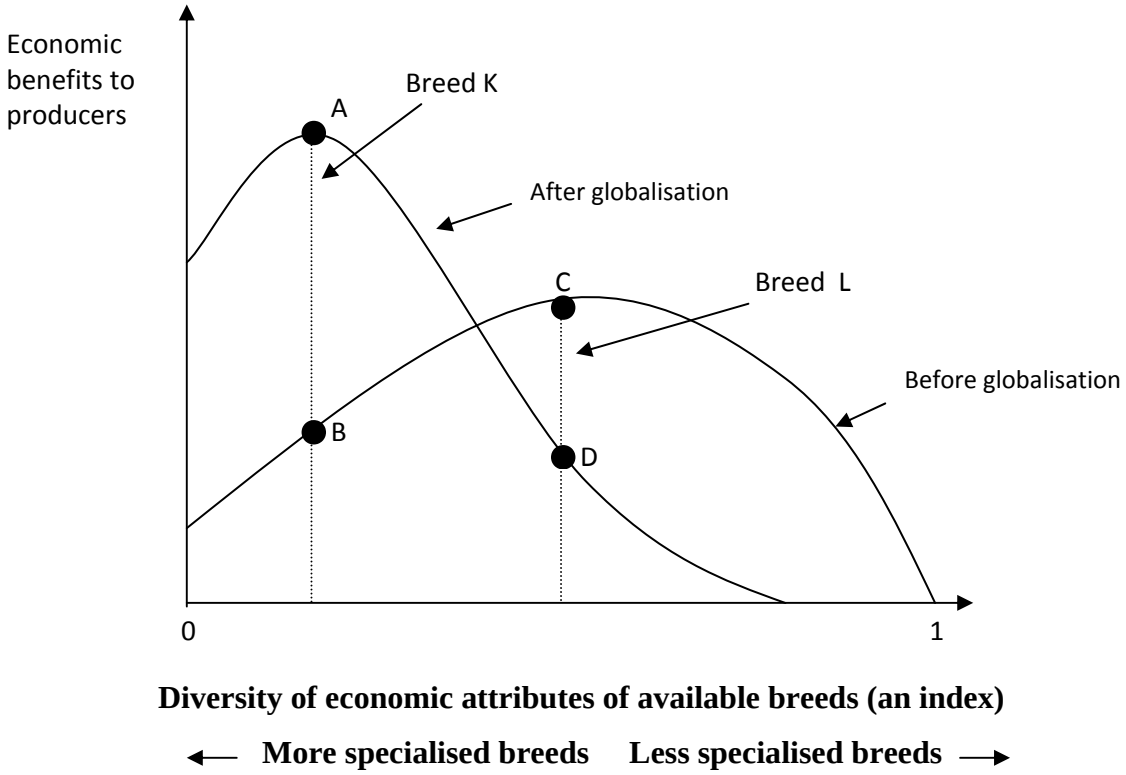
While it is acknowledged that the extension of the market system by encouraging concentration and specialisation of production has brought about large increases in production and fostered technical efficiencies, such a system has led to many irreversible externalities in the use of natural capital, an issue that remains ignored in the financing of agricultural/livestock investment projects. As Tisdell (2003, p. 370) points out 'it is a

powerful force for loss of genetic diversity'. The negative externalities, in many cases, have gone largely unnoticed. Needless to say, loss of genetic diversity in crops and livestock can have adverse consequences for sustainable economic growth. Interestingly, the concentration/specialisation of production in the agricultural sector has further implications, which has gone largely unnoticed because of the nature of the problem. Hence, another issue that sustainable finance needs to be cognizant because such a system of production, too, violates the principle of sustainability discussed in Section 2.

Before greater specialisation of production a wider variety of breeds were used than it is today. For instance, until a couple of decades ago, individual producers did not produce on a large-scale. Hence, in this situation, there was an incentive for a farmer to use 'all round' livestook breeds that produced, for instance, milk, beef, worked on the farm, manure and transport. In other words, farmers were mostly self-sufficient and sold only their surplus in the market or traded it for some other commodity. However, market extension has favoured the selection of specialised breeds and this has resulted in the gradual loss of 'all round' breeds (see, for example, Wilson and Tisdell, 2006).

The use of 'all round' breeds is a cost in a highly market-oriented production system where specialisation is intensified to produce a larger quantity for a larger market and to maximise profits. This is especially so with large market discount rates. In such a situation, market-oriented production systems will select breeds that are not 'all round' but rather those that produce more of one commodity than few items of 'everything'. Figure 4 illustrates a 'before and after' globalization situation.

Figure 4: Economic benefits of breeds available to a typical producer before and after globalisation based on different degrees of diversity of economic attributes or characteristics dictated by their genetic make-up.



Source: Adapted from Wilson and Tisdell (2006).

The vertical axis in Figure 4 shows the economic benefits and the horizontal axis shows the diversity of economic attributes of different breeds that are available for selection in the production process. For ease of presentation and clarity, the diagram is divided into breeds that produce mainly one or two items and 'all round' breeds. Those closer to the origin, are breeds that produce fewer items and produce smaller quantities of an item. As the breeds move closer to the centre the breeds produce larger quantities and bring larger economic benefits to producers, but at the same time the 'all round' qualities also begin to increase. As we move towards 1 the 'all round' characteristics of breeds become prominent. For instance, at a point close to 1, the 'all round' qualities are so great that they are not considered in commercial production. As shown, points at 0 and 1 are extreme cases. Those breeds close to 1 are of little interest to commercial producers on a large-scale, but they are valuable breeds to small-scale or semi-subsistence farmers who depend on such breeds for their livelihoods.

For the hypothetical producer, breed L is the preferred choice before globalisation. This breed provides the maximum economic benefits. Breed K is the preferred one after globalisation. Breed L gives an economic benefit to the producer of an amount corresponding to C before globalization, but only an amount corresponding to D after globalisation. The more specialised breeds could provide the producer with an economic benefit corresponding to A after globalization, which was only B before globalisation. In scenarios such as those explained in Figure 4, diverse attributes of a breed is not an asset, but diversity become a threat to the survival of the breed.

As specialized production and genetic manipulation of selected breeds increase and prices of commodities fall, they also displace small-scale farmers that mainly rely on 'all round' breeds for their form of production and livelihoods. This process, as is being witnessed currently, is accelerating the extinction process (see, for example, Wilson and Tisdell, 2006).

Hundreds of breeds (livestock and plant) have either become extinct or are on the verge of extinction mostly as a result of specialization, genetic manipulation of selected breeds and concentration of production of production. According to FAO statistics, 10% of the world's livestock have already become extinct and another 20% are facing extinction (FAO, 2000). The highest rates of extinctions have occurred in Europe and North America where concentration and specialisation of production based on narrowing of genetic material have taken place the most. As globalisation increases, this trend is rapidly spreading to other continents. A good example is Asia where the dilution of pig breeds is continuing at a rapid pace in Vietnam where the pure local breeds such as the Mong Cai are becoming a casualty. For a detailed discussion on this issue, see Wilson and Tisdell (2006). Table 1 shows the extent of the 'disappearance of the biodiversity' problem for livestock breeds.

Table 1: Status of livestock breeds of the world in 2000

Region	Extinct breeds (%)	Breeds at risk (%)	Breeds not at risk (%)	Unknown breeds (%)
Europe	18	40	31	11
North America	18	29	20	33
South and Central America	08	19	41	32
Africa	05	12	49	34
Asia and the Pacific	05	12	49	34
Near east	04	07	42	47
World	10	20	39	32

FAO (2000)

As shown in Table 1, the percentage of breeds that are at risk of extinction is highest in Europe and North America where globalisation of production is also the highest. Extinction of breeds is more than half the breeds not at risk for the same two continents. In other continents, where globalisation and economic development are still at a lower level, the breeds that have become extinct and those at risk of extinction are less than the breeds not at risk. However, if breeds are not conserved, this will change as globalisation of production proceeds rapidly in Asia (especially in China and India) as highlighted in Figure 4.

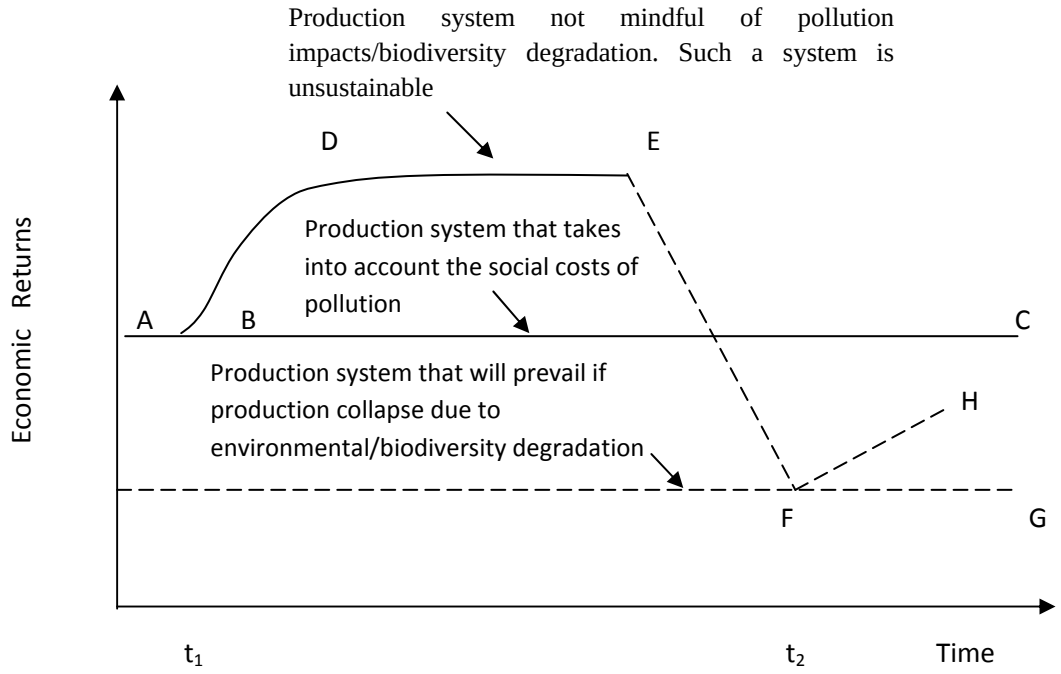
Other factors such as the demand for leaner meat, tastes, availability of storage/refrigeration, foreign aid/technology transfers accelerate the process of specialisation and concentration of production. Other production systems such as the provision of inputs are also developed for such production systems and they place greater reliance on such processes. This has happened in agricultural production systems such as grain (e.g. wheat and rice) or livestock production. This results in several 'path dependent' systems of production being created. These are powerful forces at work that are gradually undermining the genetic diversity of the production system that sustainable finance has to confront and address if such a concept is to achieve its desired objectives.

5. Economic growth without considering pollution impacts and path dependent systems is detrimental to future production

As discussed in Section 4, a myopic, profit maximising firm or firms is likely to favour a system where it pays less for pollution. Specialisation and concentration of production, as also explained in Section 4 and is being currently witnessed will result in creating 'path dependent' systems. Such a strategy, although increases production and results in higher economic growth and output (measured as GDP), the social costs are likely to reduce output

in the medium and in the long term-due to pollution damage to factors of production in the form of natural capital (land and biodiversity), health (labour) and capital. Stiglitz (2009) mentions such a situation in an article entitled 'GDP Fetishism'. This scenario is illustrated in Figure 5.

Figure 5: Economic growth without considering pollution impacts and biodiversity degradation is detrimental to future production



Source: Adapted from Wilson (2010).

The line ABC represents economic growth when pollution is checked. Economic growth is assumed to be constant. This is a sustainable path where the pollution released into the environment is cleaned up. The environmental and health impacts are not major. This limits economic growth, but is more sustainable. However, if external costs are not taken into account, more output will be produced. This is because only the private costs of production are considered. When such a system is adopted at time t_1, high economic returns (GDP) are generated, which is shown by line BDE. Under such a system, economic returns (output) are much larger because social costs of production are not taken into account. However, the system has a problem. It is unsustainable. This is because the pollution released is greater than the assimilative capacity of the environment and very little clean-up is involved, pollution begins to impact on production and hence economic growth. This is shown by the

falling broken line, EF. Production will continue on FG line and will remain so for a long time if factors of production have been damaged or disappeared. On the other hand if the environment recovers, economic growth may take place at a higher level shown by the upward sloping line, FH. With time, it is possible to reach the ABC line. However, such a process is time consuming and may take decades to fully recovery. The arguments above basically sums up the concept of sustainability discussed in Section 2.

6. Conclusions

As discussed in the paper, the issue of environmental sustainability, especially with regards to sustainable finance is complicated. As it stands, there is no formal benchmarking of sustainable practices, but only a mention of achieving environmental sustainability. The question that arises is whether it is a weak or a strong form of sustainability that is envisaged. Furthermore, the compatibility of high market discount rates with environmental sustainability needs to be clarified. As is apparent, low returns are unlikely to induce people to save and invest their income. High discount rates reflect only the private benefits of investment and fail to account for externalities.

As pointed out, it is also imperative that issues relating to adverse selection, moral hazard and industry lobbying, which is increasingly recognised as a major issue hindering the work of the environmental regulators and decision-makers needs to be addressed. This is because when the regulator is 'captured' by industry, in this case by the financial sector and its investors, it is unlikely that the most effective instruments of pollution control will be used to internalise externalities. In such a situation sustainability is compromised.

The issue of natural capital due to specialisation and concentration of production for a global market is a major concern. This is another issue that needs to be addressed urgently to halt the rapid decline of such an irreplaceable factor of production. The cost of irreversibilities are extremely large, which threatens the quality of life of the present and future generations. Finally, it is also demonstrated that it is important to ensure that current forms of production (as measured by GDP) are sustainable even if this means slowing down current rates of economic growth. However, the challenges that lie ahead for sustainable finance are many, including polluter and consumer opposition and overcoming political and bureaucratic hurdles. In any case, the finance sector in many respects has few options left other than to

switch to production that ensures the needs of the present generation are met without compromising the ability of future generations to meet their own needs. The financial sector and the concept of sustainable finance are at an important stage of development. At least with respect to sustainable finance, what happens in the next decade will decide the legitimacy of the concept itself.

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